RESOURCES ECONOMICS PRELIMINARY EXAMINATION
January 21, 1991

You have until 12:00 (four hours) to complete this examination. Exams will be collected promptly. Pace yourself in responding to questions so that you do not spend an undue amount of time on any one question at the expense of other questions. Write the last three digits of your student ID number at the top of each page of your answers, and do not write your name anywhere on the answers.

Part I: Answer all of the following three questions.

1. The January 15, 1991 edition of the Bryan-College Station Eagle reports that a lawsuit was filed against Atochem North America, Inc., a local chemical plant. This suit was filed by three property owners adjacent to the Atochem plant. The plaintiffs claim that "Atochem operated the plant in such a manner that toxic chemicals, including arsenic, have been released into the air, which has contaminated the air and plaintiffs' property." The plaintiffs are seeking unspecified damages for loss of property values.

   Assume that you have been requested as friend of the court to estimate the extent of monetary damages, if any, due the plaintiffs as a result of Atochem's activities. Indicate in your answer 1) the relevant and applicable economic theory underlying this problem, 2) the appropriate methodology you would develop, 3) all relevant variables to be considered, 4) data needed, and 5) specific hypotheses you would expect to test in order to respond to the court's request.

2. The Middle East Crisis has once again focussed attention upon the energy issue in the United States. The short term solution selected is to preserve the inexpensive supplies of the Middle East by military force. Another possible alternative would be to increase the price of energy to provide an incentive for conservation. Compare and contrast the economic implications of these two alternatives.

   Note: As part of your response, be sure to use economic theory to discuss the effect of an Iraqi shutdown of oil exports as well as how a program of energy price increases could be implemented.

3. Two nearby firms produce the same output, y. Each benefits from the other's use of the only input according to the following production functions:

$$y_1 = 2x_1^{1/2}x_2^{1/4} \qquad y_2 = x_1^{1/2}x_2^{1/4}$$

where the subscripts refer to the firm. Thus, for example, firm 1 controls x_1 but not x_2. Assume that the price of x is 1 and that the y industry is composed of only these two firms.

a. Discuss this problem setting in relation to natural resource theory. Illustrate this setting generally using two concepts of the industry's supply curve for y, PMC and SMC (private marginal costs and social marginal costs). Use these graphs to show the welfare impact associated with independent action by the two firms as opposed to collaboration.

b. Compute equations for the graphs used in part a, and use these equations to calculate the welfare effects illustrated in part a. You may select any reasonable function you wish for y demand.

Part II: Answer any one of the following two questions.

4. A common phenomena in community development activities is the offering of incentives (e.g., free land, utility rate concessions, property tax abatement schemes, etc.) to provide locational inducement for large firms, government facilities, etc. The offering of such inducements, obviously, is viewed as beneficial to the objectives of the development organizations making the offers.

   Given that this is a market phenomena, describe the markets characteristics. How would you evaluate its desirability from both the community's and society's perspective? What characteristics of such a market may make it uniquely different than other types of markets in economic theory? Or, is there no difference?

   Note: The number of highly desirable facilities is relatively fewer than number of communities seeking to provide the chosen location. Consider both temporal and geographic distribution concerns, risk, intra-community income effects and whether the facility is a private or governmental entity.

5. "Sustainable agriculture" refers to the use of those farming practices and concepts that minimize or eliminate purchased inputs, especially nutrients and pesticides. Describe and discuss the economic and environmental implications of a country such as the U.S. adjusting to agricultural production based on the principles of sustainable agriculture.